

Estimation of snow water equivalent by satellite images in Hokkaido

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In Hokkaido, there are 119 AMeDAS points that can observe the amount of snowfall. Many of those are located around urban areas. The number of AMeDAS points is not enough to observe the amount of snowfall in Hokkaido Main Island 77984km². Remote sensing is one of the best means to measure it. Satellite images in microwave range have been used to know it so far, although there is a large error in the case of wet snow. In addition, as long as synthetic aperture radar (SAR) is used, the spatial resolution is not high satellite images in microwave range. On the other hand, satellite images in the range of visible and inferred have been not suitable for observing the snow depth, although the presence of the covered snow can be measured. If almost all of optical satellite images, having high spatial resolutions, were used for two-dimensional mappings of the amount of snowfall, we will have a great advantage for applying to the drone in the near future.

This study aims to estimate the snow water equivalent through the amount of snowmelt in Hokkaido using satellite images in the range of visible and inferred, as the first step of area estimation of the amount of snowfall.

First, we have researched the correlation between the river inflow to Chubetsu Dam in Northern Hokkaido and the seasonal change of the average brightness of Landsat-8 images. We found that the both have a strong correlation. The river's basin was calculated from topographic maps and Digital Elevation Model (DEM). The area of basin is 230.5km², which is ~3.5% error compared to the officially announced at 238.9km². Since clouds and vegetation in the area make the amount of snowfall unclear, we discussed the influence.

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